

IAP9 Rec'd PCT/PTO 22 DEC 2003

SEQUENCE LISTING

SEQ ID NO: 1 (*Haemophilus aegyptius*)

MKRNLLKQSVIAVLIGGTTVSNYALAAQAQAQVKKDELSELKKQVKEMDAAIDGILDDNIAEAEVDAKLDQHSALGRHTNRLNLL
KTIAEKAKGDSSEALDKIEALEEQNDEFADITALEEGVDGLDDDIAGIQDNISDIEDDINQNSADIATNTAAIATHQRLDNLNDRV
NNLNKDLKRGGLAAQAALNGLFQPYNVGKLNLTAAVGGYKQSTAVAVG

SEQ ID NO: 2 (*Escherichia coli*)

MKTVNVALLALIISATSSPVVLADGTIEAAATELSAINSGMSQSEIEQKITRFLERTDNSPAAYTYLTEHHYIPSETPDTTQTPTVQT
DPDAGQKTVAATGDVQTTARYQSMINARQSAVTDAQQTQITEQQAQIVATQKTLAATGDTQNTAHYQEMINARLAAQNEANQRTATEQ
GQKMNALTDDVAVQQQNERQYDKQMQLAQESAQAHEQIDSLSDQDVTQTHQQLTNTQKRVADNSQQINTLNHFSSSLKNEVDNRKE
ANAGTASAIASQPVKTDGVMVVSAGAGTFNGESAVSVGTSFNAGTHTVLKAGISADTQSDFGAGVGVGYSF

SEQ ID NO: 3 (*EHEC*)

MNKIFKVIWNPATGNYTSETAKSRGKSGRSKLLISALVAGGMLSSFGALANAGNDNGQVDYSGSGAGDGWVAIGKAKANTFMNTSGSSTAVG
YDAIAEQYSSAIGSKTHAIGGASMAFGVSAISEGDRSIALGASSYSLGQYSMALGRYSKALGKLSIAMGDSKAEAGANAIALGNATKATEIMSIAL
GDTANASKAYSMALGASSVASEENAIGAETEAENATAIGNNAKAGTNSMAMGFGSLADKVNTIALNGSQALADNAIAIGQGNKADGVDAIAL
GNGSQSRGLNTIALGTASNATGDKSLALGSSSANGINSVALGADSIADLDNTVSVGNSSLRKIVNVKNGAIKSDSYDAINGSQLYAISDSVAKRL
GGGAADVDDGTVPATPYNLKNGSKNNVGAALAVLDENTLQWDQTKGKYSAAHGTSSPTASVITDVADGTISASSKDAVNGSQLKATNDDEANTAN
IATNTSNIATNTANIATNTTITNLDSVGDQLADALLWNETKKAFAAHDQDTSKITNVKDALDADSTDAVNGSQLKTTNDVATNTTNIANT
SNIATNTTINSLTETVTNLGEDALKWDKONGVFTAAGHGTETTSKITNVKDGDLTGSTDAVNGSQLKTTNDVATNTTNIATNTTINSLTETVTN
LGEDALKWDKONGVFTAAGHGNNTASKITNILDGTVTATSSDAINGSQLYDLSSNIATYFGGNASVNTDGVFTGPTYKIGETNYNVGDALAINSSF
STSLGDALLWDATAGKFSAKHGTNGDASVITDVADGEISDSSSDAVNGSQLHGVSSVVDALGGGAENVADGTITAPTYTIANADYDNVGDALNAID
TTLDDALLWDADAGENGAFSAAHGDKKTASVITNVANGAISAASSDAINGSQLYTTNKYIADALGGDAENVADGTITAPTYTIANAEYNNVGDALDA
LDDNALLWDETANGGAGAYNASHDGKASITNVANGSISEDSTDAVNGSQLNATNMMEQNTQIINQLAGNTDATYIQENGAGINYVRTNDDGLAFN
DASAQGVGATAIGYNSVAKGDSVAIGQGSYSVDVTGIALGSSSVSSRVIAKGSRDTSITENGVIYDITDCELLGALSIGDDGKYRQIINVADGS
EAHDVAVTRQLONAICAVATTPTKYFANSTEEDSLAVGTDLSLMAKTIIVNGDKGIGIGYAYVDANALNGIAIGSNAQVHVNSIAIGNGSTTTR
GAQNTYATNMDAPQNSVGEFSVGSADGQRQITNVAAGSADTDAVNVGQLKVTDQVQSNTQSIITNLDNRVTNLDNRVTNIENGIGDIVTGTSTKYF
KTNTDGVDAQAQKDSVAIGSGSIAAADNSVALGTGSVATEENTIISVGSSTNQRITNVAAGKNATDAVNVAQLKSSEAGGVRYDTKADGSDISYNI
TLGGGNGGTTTRISNVSAAGVNNNDVNYAQLKQSVQETKQYTDQRMVEMDNKLSKETSLSGGSIASAMAMTGLPQAYTPGASMASIGGGTYNGESAVA
LGVMVSANGRWVYKLGSTNSQGEYSALGAGIQW

5 SEQ ID NO: 4 (*Actinobacillus actinomycetemcomitans*)

MTYQLFKHHLVALMVTGAISVNALAKDSFLENPSANLPQQVFKNRVDIFNNETNINENKKDIAINKANIASIEKDVMRNTGGIDRLAK
QELVNRARITKNELDIRKNTKSIAENTASIRIDGNLEGVNRVLQNVDRSTENAAARSRAEQKIAENKKAIENKADKADVEKNRADI
AANSRAIATFRSSSQNIAALTTKVDRNTARIDRLDSRVNELDKEVKNGLASQAALSGLFQPYNVGSLNLSAAVGGYKSKTALAVGSGY
RFNQNVAAKAGVAVSTNGGSATYNVGLNFEW

SEQ ID NO: 5 (*Haemophilus somnus*)

MKKVQFFKYSSLALALGLVGSASALAAAPTSTSTTTGPEAPPTGPAPTAKDPLAETALAYDLENEVAYLRMKAGEWMQLGLDPEKEVIK
GWNEVKSLEPRIDGNGKDKQTKDQIAMLIRTVDNTEKELGRIVSTNIEDIKNLKKELYGFVEDVNESEARNISRIDENEKDIKNLKKELY
DFVEDVNESEARNISRIDENEKDIKNLKKELYGFVEDVNESEARNISRIDENEKDIKNLKKELYGFVEDVNESEARNISRIDENEKDIKNLKKELY
DANKQETEDDIADNAKAIHSNTKGIKNTKDIRDLDTKTKQMLENDKNLMTGLESLATETSKGFERFDVKTQQLDQAVANVGRVDIT
EQAIRQNTAGLVNVNKRVDITLTKNTKAGIASAVALGMLPQSTAPGKSLVSLVGVGHHRGQSATAIGVSSMSNGKVVVKGMSYDTQRH
ATFGGSVGVFFN

SEQ ID NO: 6 (*Haemophilus ducreyi*)

MKIKCLVAVVGLACSTITMAQQPPKFAGVSSLYSEYDYGKGTWTSNEGGFDIKVPGIKMKPKKEWISKQATYLELQHYMPYTPVLV
TSAPDVSPSSISILLYPMSDPDQLGINRQQLKLNLYSYFNDLRHDFKLKVLDAKISKNQONIDTISKYLLGLTYLDGSYRMMEQNTH
NINKNTHNINKNTHNINKLSKELQGLANQSALSMVLPNGVGKTSVSAVGGYRDKTALAIGVGSRTDRFTAKAGVAFNTYNGGMS
YGASVGYEF

SEQ ID NO: 7 (*EPEC*)

MKTVNVALLALIISATSSPVVLADGTIEAAATELSAINSGMSQSEIEQKITRFLERTDNSPAAYTYLTEHHYIPSETPDTTQTPTVQT
DPDAGQKTVAATGDVQTTARYQSMINARQSTVTDAAQTQITEQQAQIVATQKTLAATGDTQNTAHYQEMINARLAAQNEANQRTTTEQ
GQKMNALTDDVAAQQQKERAQYDKQMQLAQKSVQAHEQIESLRQDSAQTQQLTNTQKRVADNSQQINTLNHFSSSLKNEVEDNRKE
ANAGTASAIASQPVKTDGLMMVSAGAGTFNGESAVSVGTSFNAGTHTVLKAGISADTQSDFGAGVGVGYSF

SEQ ID NO: 8 (EAEC)

MKTVKLSLLAVVVATAVSPSAFAGDTVEAATTELTVIQPGMSQSEIDQKIGRFLERTGNSVAAQNYLIAHDYQTTTPQENTAASPVQP
 TNTLNPITNQACTDRDNGQDTAIQDAQHAANWASLKADDAQHAITVAQTDIDANTAAITDTRNDVSAVQSDVTNIKGDVAHAQSTADH
 ANANANTALINGVKLSGAVTENKNNIEQNRSDIADQKLLASNEQKQIVRDNGQDTAIQDAQHAANWASLKADDAQHAITVAQTDIDA
 NKAATDIRNDVSAVQSDVTNIKGDVAHAQSTADHANANANTALMNGVKLSAVTENKNNIEQNRSDIADQKLLASNEQKQIVRDNG
 QDTAIQDAQHAANWASMKADDAQHAITVAQTDIDANKAAIADTRNDVSAVQSDVTNIKGDVAHAQSTADHANANANTALINGVKLSGA
 VTENKNNIEQNRSDIADQKLLASNEQKQIVRDNGQDTAIQDAQHAANWASLKADDAQHAITVAQTDIDANKAAIADTRNDVSAVQSDVTNIKGDVAHAQSTADHANANANTALINGVKLSGA
 TNAHYQEMVNAGLRAQNDANARTAAEQKQKIDTLATNQATQQHINSVQYGEQIQRLAQDSTQTHEQIDSLTQDVTQTHQQLSNTQKRV
 ADNSQQITTLNNHFSSLKNEVEDNRKEANAGTASAIASQPPQVKAGDFMMSAGAGTFNGESAVSVGTSFNAGTHTVIKAGVSADTQ
 SDFGAGVGVGYSF

SEQ ID NO: 9 (EAEC)

MNKIFKVIWNPATGSYTVASETAKSRGKSGRSKLLISALVAGGMLSSFGVQAQAGRDNGQGVNYGQGTGTGWVAIGEDAKANSFTDT
 GGGSSSTAVGYHSTADGRWSTALGAKTHSLGEASVALGINTTSAGERSLAIGASATSTGGFSIALGRYANSVGEFSIAQGDHAETGADD
 AIAFGRESKALGIMSIALGATANASKEYAMALGASSAASANAIAVGRNSAAAGVDSLAFGRQSAASAANAIAAMGAESKAAENATAVG
 TNAEANGLSIALGSGSIADVDNTIALGNQSQAVAAGAIAGQGNKADGANAIALNGSITGGVNAIALGQGSYAGLENGTAIGAQAS
 AQGKNSVALGAGSVATDADTVSVGNNTAQRQIVNMAAGDISTTSTDAINGSQLYAISKSVADNLGGGATVNAQGVVTSPIYRLKSGIF
 GTVGDALTLGNNTLQWDSLKKAISAHGTDTTSTITNVKDGAIISDTSKDAVNGSQLKTTNDNVATNTNITNLTDVSGDLKDDALLWNGTAFSAHGT
 KDDALLWNGTAFSAHGTATSKITNVKDGDLTAGSTDAVNGSQLKTTNDNVATNTNITNLTDVSGDLKDDALLWNGTAFSAHGT
 ATSKITNVKDGDLTAGSTDAVNGSQLKTTNDVAANTTNATNTNITNLTDVSLGDDSLWNATAGAFSAHGTDATSKITNVTA
 GDLTAGSTDAVNGSQLKTTNDVAANTTNATNTNITNLTDVSLGDDSLWNATAGAFSAHGTDATSKITNVKDGDLTAGSTDA
 VNGSQLKTTNDVAANTTNATNTNITNLTDVSLGDDSLWNATAGAFSAHGTNGTDSKITNLLAGTVSSDSTDAINGSQLYGL
 ADSFTSYLGGGADISDAGVLTGPTTYTIGGTDYNNVGDALAAINTSFSTSLGDALLWDATAKGGDGAFAAGRGTDNTASIIITNVADGAI
 SSTSSDAINGSQLYDTSKYIADTLGGDAEVNADGTITAPTYYAAGGSYSNVGDALDAIDTTLDDALLWDATANDGNGAFSAHGDKT
 ASVITNVANGAISATSSDAINGSQLYTTNKYIADALGGDAEVNADGSITAPTYYIANAEYNNVGDALDALLDNDALLWDATANDGAGAY
 NASHDGKASIIITNVADGNIGEGSTDAINGSQLFNTNMLIQNSEIINQLAGNTSETYIEDNGAGINYVRTNDGLAFNDASASGIGAT
 AVGYNAVASGESSVAIGQSSSNVDTGIALGSSSVSRVIVKGRDTSVSEGVVIGYDITDGLLGLSISGDDGKYRQIINVADGSE
 AHDVTVRQLQNAIGAVATTPTKYFHANSTEEDSLAVGEDSLAMGAKTIVNGNAGIGIGYAYVDANALNGIAIGSNARANHANSIAM
 GNGSQTRGAQTGYAAYNMDAPQNSVGEFSVGESEDRQRTINVAAGSADTDAVNVGQLKVTDAQVVSQNTQSIITNLNNQVTNLDRVTN
 IENGIGDIVTTGSTKYFKTNTDGDVANAQCKDSVAIGSGSIAAADNSVALGTGVSANEENTISVGSSTNQRRITNVAAGVNATDAVNV
 SQLKSSEAGGVRYDTKADGSVDYSNITLGGGNGGTTRISNVSAAGVNNDAVNVAQLKQSVQETKQYTDQRMVEMDNKLSKTESKLSGG
 IASAMAMTGLPQAYTPGASMASIGGGTYNGESAVALGVSMSANGRWVYKLGQSTNSQGEYSALGAGIQW

SEQ ID NO: 10 (UPEC)

MNKIFKVIWNPATGSYTVASETAKSRGKSGRSKLLISALVAGGLSSFGASADNYTGQPTDYGDGSAGDGVVAIGKGAANTFMNTS
 GASTALGYDAIAEGEYSSAIGSKTLATGGASMAFGVSAMKMDRSVALGASSVANGDRSMAGRYAKTNGFTSLAIGDSSLADGEKTI
 ALGNTAKAYEIMSIALGDNANASKEYAMALGASSKAGGADSLAFGRKSTANSTGSLAIGADSSSSNDNAIAGNKTQALGVNSMALGN
 ASQASGESSIALGNTSEASEQNAIALGQGSIAKVNISIALGNSLSGGENAIALGESSAAGGSNLAFGSQSRANGNSVAIGVGAAA
 ATDNSVAIGAGSTTASNTVSVGNSATKRKIVNMAAGASNTSTDAINGSQLYTISDSVAKRLGGGATVSGDGTAVSYALRSCTYN
 NVGDALSGIDNNLTQWNTAGAFSANHGANATNKITNVAKGTVSATSTDVVNGSQLYDLQDALLWNGTAFSAHGTATSKITNVTA
 GNLTAGSTDAVNGSQLKTTNDNVTTNTNITATNTNITNLTDVAVNGLGDDSLWNKAAGAFSAHGTATSKITNVTAGNLTAGSTDA
 VNGSQLKTTNDNVTTNTNITATNTNITNLTDVAVNGLGDDSLWNKAAGAFSAHGTATSKITNVTAGNLTAGSTDAVNGSQLKTTN
 DNVTTNTNITATNTNITNLTDVAVNGLGDDSLWNKAAGAFSAHGTATSKITNVKAGDLTAGSTDAVNGSQLKTTNDNVSTNTNIT
 NLTDAVNGLGDDSLWNKAAGAFSAHGTATSKITNVKAGDLTAGSTDAVNGSQLKTTNDNVSTNTNITNLTDVSGDLKDDSLW
 NKAAGAFSAHGTATSKITNLLAGKISSNSTDAINGSQLYGVADSFSTSYLGGGADISDTGVLGSGPTTYTIGGTDYTNVGDALAAINTS
 FSTSLGDALLWDATAGKFSKAGHINNAPSVITDVANGAVSSTSSDAINGSQLYGVSDYIADALGNAVNTDGSITPTTYAIAAGGSYN
 NVGDALDAIDTTLDDALLWDATTANGGNGAFSAHGDKTASVITNVANGAVSATSNDAINGSQLYSTNKYIADALGGDAEVNADGTIT
 APTTYTIANNTDYNVGEALDALLDNNALLWDEDAGAYNASHDGNASKITNVAAGDLSTSTDAVNGSQLNATNIIIVTQNSQMINQLAGNT
 SETYIEENGAGINYVRTNDGLAFNDASASGIGATAVGYNAVASHASSVAIGQDSISEVDTGIALGSSSVSRVIVKGRNTSVSEEG
 VVIGYDITDGLLGLSISGDDGKYRQIINVADGSEAHDAVTVRQLQNAIGAVATTPTKYFHANSTAEDSLAVGEDSLAMGAKTIVNGN
 AGIGIGLNTLVLADAINGIAIGSNARANHADSIAAMGNGSQTRGAQNTYATNMDAPQNSVGEFSVGESEDRQRTINVAAGSADTDAV
 NVGQLKVTDAQVVSQNTQSIITNLNTQVTNLDRVTNIENGIGDIVTTGSTKYFKTNTDGDVANAQCKDSVAIGSGSIAAADNSVALGTG
 SVADEENTISVGSSTNQRRITNVAAGVNATDAVNVSQLKSSEAGGVRYDTKADGSDIYSNITLGGGNGGTTRISNVSAAGVNNDAVN
 AQLKQSVQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMAMTGLPQAYTPGASMASIGGGTYNGESAVALGVSMSANGRWVYKLGQ
 STNSQGEYSALGAGIQW

MTNLGEDALKWKDNGVFTAAGHTETTSKITNVKDGDLTTGSTDAVNGSQLKTTNDAVATNTTNIATNTTNISNLTEVTVNLGEDALK
WDKDNGVFTAAGHNNTASKITNILDGTVTATSSDAINGSQLYDLSSNIATYFGGNASVNTDGVFTGPTYKIGETNYYNVGDALAAINS
SFSTSLGDALLWDATAGKFSAKHGTNGDASVITDVADGEISDSSSDAVNGSQLHGVSSYVVDALGGGAEVNADGTTIAPTYYTIANADY
DNVGDALNAIDTTPDDALLWDADAGENGAFSAAHGKDKTASVITNVANGAISAASSDAINGSQLYTTNKYIADALGGDAEVNADGTTI
APTYTIANAEYNNVGDALDALDDNALLWDKTANGGAGAYNASHDGKASIIITNVANGSISEDSTDAVNGSQLNATNMIEQNTQIINQL
AGNTDATYIEENGAGINYVRTNDNLAFNDASASGVGATAVGYNVAVSGASSVAIQNSSSTVDTGIALGSSSVSSRVIAGKSRDTSV
TENGVVIGYDITDGEILLGALSIGDDGKYRQIINVADGSEAHDAVTVRQLQNAIGAVATPTKYFHFANSTAEDSLAVGEDSLAMGAKTV
VNGNAGIGIGLNTLVLADAINGIAIGSNARANHANSIAMNGSQITRGAQTGYTAYNMDAPQNSVGEFSVGEDGQRQITNVAAGSAD
TDAVNVQELKVTDVERVAQNTQSIITNLNNQVTNLDTRVNTNIENGIGDIVTGSTKYFKTNTDGDVDAQAQKDSVAIGSGSIAAADNSVA
LGTGSVABEENTISVGSQNTQRRITNVAASVNATDAVNVSQKLSSEAGGVTRPYTKADGSDIYSNITLGGNGSTTRISNVSAAGVNNND
AVNYAQLKQSAQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMAMTGLPQAYTPGASMASIGGGTYNGESAVALGVSMSVANGRWVY
KLGSTNSQGEYSALGAGIQW

MVFSAMPQYACAEMLLQNDPGTNCGSVGDAYAWARGDGYSGCKVGYEAAKNLAKGTAFGNSLGQLSPGTNILVYGSTLRAGMNDVTP
LDSMNIGGHLDVWGASGFHGGVDMNNSAIKNLADGTLSATSTEAVTGRQLNATNTNITNLQNSIKSISSASLVQQSAAGKDITVAKD
LDGDAVDFSGKKLSDSTTFSRKLTGVAEGTLSATSTDAVSGKQLYTTNQNLSSTTNQNLA DTNKS LAETNKNVSATTTNITNLQNTIKN
ISGGSAGLVQQSAAGKDITVAKDL DGEAVDFSGKKLSDSTTFSRKLTGVAEGTLSATSTDAVSGKQLYTTNQNLA STNKDLANTNTR
TTAEGNLSSTTTSITNLQNTIKNISGGSAGLVQQSAAGKDITVAKDL DGA VDFSGKKLSDSTTFSRKLTGVAEGTLSATSTDAVSGR
QLYTTNQNLSSTTNQNLA DTNKS LAETNKNVSATTTNITNLQNTVNNISSGSAGLVQQSAAGKDITVAKDL DGA VDFSGKKLSDSTT
SRKLTGVAEGTLSATSTDAVSGKQLYTTNQNLSSTTNQNLA DTNKS LAETNKNVSATTTNITNLQNTVNNISSGSAGLVQQSAAGKDIT
VAKNLDGDAVDFSGKKLSDSTTFSRKLTGVAEGTLSATSTDAVSGKQLYTTNQNLA STNKDLANTNTRLTTAEGNLSSTTTSITNLQNT
TIKNISGGSAGLVQQSAAGKDITVAKDL DGA VDFSGKNLS DSTTFSRKLTGVAEGTLSATSTDAVSGKQLYTTNQNLSSTTNQNLA DT
NKS LAKTNNNV SATTTNITNLQNTVNNISSGSAGLVQQSAAGKDITVAKDL DGA VDFSGKKLSDSTTFSRKLTGVAEGTLSATSTDA
VSGKQLYATNQNVSKLSANVTDVSDSVTNIKNMTNITVNGGGLKYFHANSTLDDAQAMGLIESIAFGGA A VAAGMNSMAMGGNARAVAG
NAVALGAGSVADRANTANVSQSGAKERQITNVAAGTADTDAVNVAQLKAAGIINGSGRNTATVYTGNTADGSDYGNVTLGGGNAPAGT
AIHNVAAGTAETDAVNVRQMNAAIASVQKVSNTNDPMAFADGDRAVKRASAKGTHATAMGAASAGGDQSVATGHNNAQSGGDSVAMG
ANAKATANHAETVAGSGSVANRANTNSVSGSAGERQITNVAAGVQGTDAVNVSQLSQAVYAAGVDLPAGTTARQYTDEQIGMVRQGISO
VARGAYSGIAAATALTMPD VDOGKSIAIGIGSATYKGYOAVALGASARISHNLKAKMGVGSSEGGTTVGMGASYOW

MALGRQSVSAGSGSLAFNGSYANSNGSVAIGQSAYAA NVRAIAIGDDFAFWREAEQTKAGGSQSIAMGVRARTKSLVDDPDTVAN
EADPGGASDAIAIGTDAQANGDRSLAIGRQNQAGNEQSIGIGAGNTATGKLSIGIGSSNVASGEQSLSLGAGNNALQGSISIGTETT
AGGLRSIAFGVRASTKEANLDIPDDVAIDAIAIGTNTKANGDRSVSIGTGSQASSGAVSIGDAAKAVGDKSVSIGTESWADGDESVS
IGLVNNAGFEGNDRIKGGQTSVSLGAFNQSPGIEAIAIGARNEANADRSIAIGSRAKTKAADPAQADGGARDAVAIGTDALANDRSI
SIGWNSSTSLNDSISIGTRATSGSAGDIMIGTSGTGSTSGQNNVALGVAASQKVKGSSNIAIGDSAGGSREGDNNVAIGTNAGIQFS
ESEHETAVRADLVVSDAVSIGNEALASADEAIAIGTGAVASGLKSISITGVGNTVSGASSGAIGDPTDITGTGSYSLGNDNTIADNAG
TFGNDNTLADAADGSRVINGNNIDVSDAFVLGNGADVTEVGGVALGSGSVSDTGADVAGYVPGGASTADQNAIEATQSTRGAVAVGN
PDAETGVYRQITGVAAGTADSDAANVAQLKSVETIAKTGWKLTSTDGSGIDGIGPGDELVLKGGDGNIVISNQILSNDVSIDLADIEV
NRVTARDPDTGASTVLDENGLSFTTQDANGEDTALGPRVTAAGIQAGKITNVAAGEADTDAVNFSQLRQVETASGNTDQRAVKYDWT
DANTNGVIDEGELNLDSVTLAGGMGGTRISNLAPGALSAASTDAVNGSQLFGLRSRVSNVAVALGGGAAYDPVKDEWIAPKYTIGGTD
YSNVGDALAAVGGTAGAGWSLSAQGANASNAPGETVDLRSGDGNIVVSKAETGDTVSFDLADDLVSESI TVGADPADPNAPT TVIT
GGSIVIGSTMLGSNGLVITGGPSVTTDGDAGGMKVTNVANGTVAKDSKDAVNGGQLFDVVANATANGVGYDDKSKGTLTLEGANGTK
ITNVAAGDLNANSTDAVNGSQLYATNVKVDRLDTEVKEIDSRVTYIESFQGDLENAAYVYD TDAGKRNLTLTLEGGDPDKPVLIANVA
KGVNAADVNVLGQLEDSVAESKSYTDEKTEWALDQAAIYTDQVIETKVSADVNNYAQQRFYQLSGEIGQVRSEARQAAIIGLAASLRF
DNEPGKLSVALGGGFWRSEGALAFGAGTSEDPGRVRLANTGAAGGNCVGVAGLSITLN

SEQ ID NO: 16 (*Bradorhizobium japonicum*)

MRAFGSGNAINGTNYAAVGSNNVAVGNGAVVGSNGVTDNTAAFGSSIGIAGGNNAVGSFSTVTGNSAAVGSFNNVSGNNSGAF
GTGQNIIRNGTFAIGDPNIVNGNLSLVFGDNNTVNGSNVAGRGDNIQLVGSNNNTIAATSSAAGSSVFGSGNTVNTATNAVVMGNNSTVS
GASSVAIGNGTAVTGINAIAAMGTGAGANFDNSVAIGSGATTTRANQVAVGTASSTYTMSSGITSAAASKAAQSGPTQLVTSDAAGNLATT
SLAGLGLASAGDINGINSQALALNGRVDNLTRESRGGVALALAASSLQFDPKPKISVSGGFNGFQGSGLAVGLGYSYSDAMRFNAA
FTAAQQGAIGVRAGASWTLN

SEQ ID NO: 17 (*Burkholderia fungorum*)

MNKTYRSVWNESTGTWVAASEHASARGKKSSAKTSSTKAVVGALGLAAGLYGADAFALGGGLTLCPTTEGSAGYTAGSASSANGAYCG
SDYQWGLFSNTNADGSKSGQPIGAAIEGMNDGSLLLYGPNNIIVMKNLVSMSNNKIINLAPGTVSSTSDAVNGSQLYATNQVNSNIGN
TVNNITTGAGIMYFHVNSTLADSTANGVNSIAIGGATRTDANNISISIGTGLTQASSNTGAIAGQNASINVYGANSIAIGTNSATGGI
GGAIALGENAFATGGKMLALGSGASATTANSVALGSGSTTTANLTAAGYNPGSGTLAGTSQATNGEVSVGNAGAERRITNVAAGSAAT
DAVNVSQLQSEDAKVNTINNNVNLGSGVTNISSTVNNITNGGGIKYFHANSTQADSSATGTDVAIGGNAQATAANSVALGLNSTSK
GTNAIALGGAVAGGSYAFAGSLALAATTGDIALGSSATASSANSAYATALGTNALANATDATAIGEASATAASSVALGARSKTTA
NLSTAGYNPGTGLSGTTPTEGEVSVGSAGKERRVTNVAAGSAATDAVNVSQLMSEDAKVNTINNNVNLGSGVTNIAGNVNTNISNTVN
NITNGGGIKYFHVNSTLADSSAGGTNSIAIGGGATTGNVTAGTSDNISIGTNATTNYGKNIAIGGNAQALGGAYDGGYNTAIGENAI
KGDGAGGFGGGGWGQTAAIGGGSQALHDNTTAVGSGAIANVANATALGMSASATAGSAIALGQGAVASAANSVALGSGSTTTXNLAA
GYNPGTGLSGIASVANGEVSVGAAGKERRITNVAAGSAATDAVNVSQLQSEDAKVNTINNNVNLGSGVTNISNTVNNITNGGGIKY
FHTKSTLADSSATGTDVAIGGNAQATAANSVALGSGSTTTANLSAAGYNPGTGALSGIASAANGEVSVGAAGKERRITNVAAGSAAT
DAVNVSQLQSEDAKVNTISNNVNLGSGVTNISSTVNNITNGGGIKYFHTNSTLADSTANGVNSIAIGGATRTDANNISISIGTGLTQA
SSNTGAIAGQNASINVYGANSIAIGTNSATGGIGGAIALGENAFATGGKMLALGSGASATTANSVALGSGSTTTANLTAAGYNPGSG
TLAGTSQATNGEVSVGNAGAERRITNVAAGSAATDAVNVSQLQSEDAKVNTINNNVNLGSGVTNIAGNVNTNISNTVNNITNGGGIKY
FHTKSTLADSSATGTDVAIGGNAQATAANSVALGSGSTTTANLSAAGYNPGTGLSGTTPTEGEVSVGSAGKERRVTNVAAGSAATDA
VNVSQLQSAIIGSTANAVAYDDGKATVTLKGASGKITNLTAGNLSATSTDAVNGSQLYATNQVNSNIGNTVNNITNGGGIKYFHAN
STQADSSATGSNSVAVGDRASSLGGSSVAMGDGATAVGAASIAIGNNAQNVTSNNSVAIGGDSKAGDRSVSLNGADTSLSSWGVAV
GTNANVSAAALGTAIGAGANVSGANSTAIGANAVASATNSVALGSGSTTTANLSAAGYNPGTGLSGIASAANGEVSVGAAGKERRVTN
VAAGSAATDAVNVSQLQSEDAKVNTINNNVNLGSGVTNISSTVNNITNGGGIKYFHTNSTLADSSAGGANSIAIGGGAATSSSAGLS
DNMAIGTNATASYGKNIAIGGGAQATGGTYDGGYNVALGENANATACTNAWCHNTAIGANTVINGVNSVALGISATTSGSGSMAFGSA
AQASADYAIASGAGANASAVNSVALGSGSTTTANLSAAGYNPGTGLSGIASVANGEVSVGSAGKERRVTNVAAGSAATDAVNVSQLQ
SEDAKVNTINNNVNLGSGVTNISNTVNNITNGGGIKYFHTNSTLADSSATGTDVAIGGNAQATAANSVALGSGSTTTA
NLSAAGYNPGTGLSGTTPVGEVSVGSAGKERRVTNVAAGSAATDAVNVSQLQSAIIGSTANAVAYDDGKATVTLKGASGKITNL
AGNLSATSTDAVNGSQLYATNQVNSNVGNTVSNLSNNVTNIAGNVNTNISNTVNNITNGGGIKYFHTNSTLADSSATGTDVAIGGNAQ
ATAANSVALGSGSTTTANLSAAGYNPGTGALSATTPVGEVSVGSAGKERRVTNVAAGSAATDAVNVSQLMSEDAKVNTINNNVNLGSG
NVSNIAGNVNTNISNTVNNITNGGGIKYFHTNSTLADSSATGTDVAIGGNAQATAANSVALGSGSTTTANLSAAGYNPGTGALSGIA
SAANGEVSVGAAGKERRITNVAAGSAATDAVNVSQLQSEDAKVNTINNNVNLGSGVTNISNTVNNITNGGGIKYFHTNS
TLADSSATGTDVAIGGNASASAANSVALGSGSTTTANLSAAGYNPGSALSGTASAANGEVSVGAAGKERRITNVAAGSAATDAVNV
SQLQSEDAKVNAEGAATAAALGGGTYNTTTGATSPYIAGGKTFNNVGDVVTNIDGRVTQNSTDITNLTTTIDNGTIGLVQATPT
STITVAKDTGGATVDFRGTGNATRTLGTITAGELSATSTDAVNGSQLYATNQVNSNIDNTVSNLSNNVTNIAGNVNTNISNTVNNITNG
GGIKYFHTNSTLADSSATGTDVAIGGNAQATAANSVALGSGSTTTANLSAAGYNPGTGLSGIASAANGEVSVGAAGKERRVTNVA
AGSAATDAVNVSQLQSEDAKVNTINNNVNLGSGVTNISNTVNNITNGGGIKYFHTNSTLADSSATGTNSLAAGPAAVAS
ATDAVALGNKATNAGAVALGAGSTTTTAVATSGTTIGGITYTFAGVAPSSVSVGAAGSERTITNVAAGRLSATSTDAVNGSELFA
TNQQVTRNTADITNLTNMNMIGSVGLVQQDATTRITVAKATDGTVDFTGTGGARQLTGVAAGAVNATSVDAVNGSQLYGVSVQSVAD
AIGGGSTVNTDGSISAPTYVVDGTTVHNAGDAISNLDNRVTQNTTIDISTINNTLSITTGAGVKYVHVNSTLADSLAKGAESVAIGGN
AQSQANSVALGSGNSVADRANTVSVGAAGAERQITNVAAGTADTDAVNVQALKASGVINTDGTNAAVTDHNDGSAVNSVTMGNG
VAGGTTIHNVAAGSAADDAVNVSQMNAIISVSNIIGSAGNPLFTADGNRDTEAAVASGTHATAMGANAKASAANSVALGANSVADRE
NTVSVGSAGNERQVTNVAAGTATDDAVNVQQLNQAIGASIGNLPAGMSAKDYTDQQINAVQNGVNVQAKNAYAGIAAATALTMIIPD
QKTIIVGVGGGSYKGSQAVALGISARITQNLKMKAGAGTSSQGTTVGLGASYQW

SEQ ID NO: 18 (*EPEC*)

MLIQNSEVINQLAGNTSETYIEENGASINYVRTNDTGLTFTDASAAGIGSTAVGYNTVAKGDNVSAMGYNSFAEGHSSVAIGQGSYS
GVETSIALGSESVSRRVIVKGSRNTSVSEEGVIGYDITDGLLGLALSIGDDGKYRQIINVADGSEAHDAVTVRQLQNAIGAVATPT
KYYHANSTAEDSLAVGEDSLAMGAKTIVNGNAGIGLNTLVLAINGIAIGSNARANHADSIAAMNGSQTTTGAQTNTYAYNDAP
QNSVGEFSVGSSEDGQRQITNVAAGSADTDAVNVGQLKVTDAQVSVQNTQSITNLNTQVTNLDTRVTNIENGIGDIVTTGSKYFKTNTD
GVDANAQCKDSVAIGSGSIAAADNSVALGTGSGVANEENTISVGSSTNQRRITNVAAGVNATDAVNVSQLKSSSEAGGVRYDTKADGSID
YSNITLGGGNGGTTTRISNVSAVNNNDVAVNYAQLKQSVQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMAMTGLPQAYTPGASMAS
IGGGTYNGESAVALGVSMVSANGRWVYKLQGSTNSQGEYSALGAGIQW

SEQ ID NO: 19

GSGGGG

SEQ ID NO: 20 (*Haemophilus aegyptius*)

GTACCGCAGAGCTGGCAAAAAGGCACGGCAGTCTCTTTGTGCGAAGCCCATGATTACAAGTTGCTAGGTAAATCAAACGTTATAC
TGAGGAAATTTTAAAGGCACGCATTTTAGCAGGTTTAGAACCTCGCACTAAGCCACCAAAAGATGGCGAAGTGAATCTGTGAGCAAA
AAACAAAAGGCGCGCATTAAGAAAAACGTGAAGATAAGAAAAAACAGAGGCCAAAGAAAAAGTAAATTCGCTCATAGGATACAA
AAAATATCGGCCAAACGACGCAAGCCAAGTAATAGTAATATTTAATTAGGTATGATGTAAATCTCTGCTTGAGGCAAAATTTACATAGGA
AATTTTCTATATTGCTTTAACGTTTTTTTATAGTAGAAGTATATACTCAGTTATGTTTATGTTACATAGTATAGTTTACTTTGTT
CTAGTTCACTTTAATAACCTTAAATAATTGAGGATTTCTTATGAAAAGAAATTTATTAACAATCTGTAATCGCTGTGTTGATAGGT
GGCACTACTGTTTCTAATTATGCTTTAGCACAAGCACAAGCACAAGCACAAGTCAAAAAGATGAACCTTAGTGAGTTAAAGAAACAAG
TAAAGGAAATGGATGCTGCTATCGATGGTATCTTGATGATAATATGCTTATGAAGCTGAAGTTGATGCAAACTTGATCAGCATTC
TGCTGCTCTTGGTAGACATACAAATAGACTCAATAATCTTAAACGATTGCAGAGAAAGCAAAAGGTGATTCAAGTGAAGCACTTGAT
AAAATGAAGCTCTTGAAGAACAAATGATGAGTTTTAGCGGATATTACAGCTTTAGAAGAGGGAGTTGATGGTTTAGATGATGATA
TCGCAGGTATTCAAGATAATATTTCTGATATAGAAGATGATATTAATCAAAATCTGCAGACATCGCAACTAACACAGCGGCAATCGC
AACTCACACTCAACGCTTGTATAATTTAGATAACAGAGTAAATAACCTTAATAAGATCTTAAACGTGGTCTTGCTGCTCAAGCTGCA
TTAATGGTTTTATTCCAACCGTATAACGTAGGTAAATTAATCTTACTGCTGCTGTAGGTGGTTATAAATCTCAAACGTGAGTTGCTG
TAGGTAC

SEQ ID NO: 21 (*Haemophilus somnus*)

ATGAAAAAGTACAATTTTTTAAATATTCATCATTGGCATTAGCATTGGGTTTAGGGTAAGTGCTTCTGCTTTGGCAGCCCCAACAA
GTACAAGTACGACTACTGGACCAGAGGCGCTCCTACAGGCCCTGCTCCTACGGCGAAAGACCTCTAGCAGAAACAGCGTTAGCCTA
TGATTTGGAGAACGAAGTTGCGTATCTTCGTATGAAGGCGGGTGAGTGGAATGCAATTGGGGCTTGATCCTGAAAAGAAAGTCATCAAA
GGCTGGAATGAGGTAAATCTCTCCCTCGTATCGATGGAATGGAAGGATAAACAGACAAAAGATCAATAGCAATGTTGATAAGAA
CGGTTGATAATACAAAAGAGCTTGGTCCGATCGTTAGTACAACATTGAAGATATTAGAACCCTTAAAAAGAGCTTTACGGTTTTGT
AGAAGATGTGAACGAGAGTGAAGCAGCAATATCTCAAGAATAGATGAGAATGAGAAGATATTAGAACCCTTAAAAAGAGCTTTAC
GATTTGTAGAAGATGTGAACGAGAGTGAAGCAGCAATATCTCAAGAATAGATGAAAATGAGAAGGACATTAATACTCTTAAAGAGC
TAATGGATGAGGATTTAAATTCAGTCTTAACCCAAATTGAAGATGTAAACCTCACATTTCAAGATGTCAATGATAACGTTAATTTGGC
ATTTGAAGAGATTAATGGAAATGCCCAAAGTTTGACACTGCTATTGAAGGACTTACTTCAGGTTTGAGCGATTACAAGCTAAAGTC
GATGCAATAAACAAGAACTGAAGACGATATTGCGGACAATGCCAAGGCTATTATAGCAACACAAAAGGTATTGCTAAAAATACCA
AGGATATTCGTGACTTGGACACCAAAACCAAGCAAAATTTGGAATGACAAAACTTGATGACCGGTTTGAATCTTTAGCAACAGA
AACAAGCAAAGGCTTTGAAAGATTTGATGTCAAAACACAACATTAGATCAAGCCGTCGCAAAATGTCGTCGGTCGAGTAGACATAACT
GAGCAAGCTATTGCGCAAAACACTGCAGGCTTAGTCAATGTGAATAACGTCGATACACTCGACAAAAACCAAGCCGGTATCG
CTTCTGCAGTCTGCTTTAGGTATGTGCCACAATCCACTGCTCCGGTAAATCATTAGTGAGCTTAGGTGTCGGTCATCACCGTGGGCA
AAGTGCTACTGCTATTGGAGTATCTTCTATGAGCAGTAACGGTAAATGGGTTGTTAAAGGCGGTATGAGCTATGATACACAGCGTCAT
GCTACTTTTCGGCGGTTCTGTGCGTTTTTTCTTTAACTAA

SEQ ID NO: 22 (*Escherichia coli*)

ATGAAAAGTGAACGTAAGCTTTTACTGGCACTCATAATTTAGCAACATCCAGCCCTGTTGTTTTAGCTGGTGATACCATTGAAGCGG
CGGCAACAGAGCTTTGAGCCATTAACTCTGGCATGTGCAATCGGAGATTGAGCAGAAGATTACCGCTTTTGAACGCACAGACAA
CAGCCCCGCTGCGTATACCTATTTGACTGAACATCACTACATCCCTTCTGAACACCTGATACCACTCAGACTCCCACTGTCCAGACA
GATCCTGACGCAGGACAAAAACCGTTGCCGCTACAGGTGATGTACAGACAACCTGCCGTTATCAGAGCATGATCAACGCCCGACAGT
CTGCGGTAACGACGCCAGCAACGCAATTAACAGAGCAACAGGCGCAGATCGTAGCCACACAAAAACGCTCGCCGCGACTGGAGA
TACGCAAAATACCGGCATTTACAGGAAATGATTAATGCCAGACTGGCGGCTCAAAATGAGGCTAATCAGCGCACCGCCACTGAACAA
GGGCGAGAAATGAATGCGCTGACAACCGATGTGGCAGTACAACAGCAAAATGAAAGGACTCAATACGATAAACAATGCAAGTCTGG
CGCAGGAGTCTGCCCAGGCACATGAACAAATTTGACAGCCTGTCACAAGACGTAACCCAAACGCACCAACAGTTAACAACACCCAAAA
ACGGGTTGCAAGATAACAGCCAGCAAAATTAACACGCTCAATAACCATTTTCAGTTGCTGCTAAAAACGAAGTTGATGACAATCGTAAAGAA
GCCAATGCGGGAATGCACTGCTGCTATCGCCTCACAAACACAGGTTAAACCGGTGACGTGATGATGGTGTGAGCGGGAGCGG
GAACCTTCAACGGTGAATCTGCGGTGTCTGTGGAACATCATTTAATGCCGGAACGCATACGGTACTTAAAGCCGGTATTCTGCGGA
TACACAATCTGATTTTCGGCGCAGGTGTGCGCGTGGGATATTGCTTCTAA

5 SEQ ID NO: 23 (*Escherichia coli*)

ATCGCCAAACAGCGTCGGCGTCTGGGCGCAGTAAGAGACTTGCTGACGGTAGATTCTGGCTTTAGTGTGCTGACATCCTCACCTTCA
AACAGTAACGTTCCGCTGGTTGGGCTGATCAATGAAGCAACTATTTTAGCAGCGTACTTTTGCCACAACCAGAAGGACCGGTAATTA
ACTTAAATTCGCCAGCAGCAGCGAAAAATTTGATGTTATTAAGAATCTTCGCATACCCGCCAGATATCCTACGTTTTGTAGCTGAAG
CAAAGGACTATTTCTGCATCGCTGTTCCCTTTTTCTGATTTTACTAAAAACAGTTTATCCTTCGAGGAATAAGGGGAACTCTC
TTTCACTAATCAGGTATAATTTGTTAATCAAGCAGCAATTTGCTGATTATGGACGGTACAACAGGAGGTTTTCCGATGCTTATCT
TTATCCCATTCTATTTTGTGCGCTGGTCATTGTGCGCGCGGGCTCAAAATCGTGCCGCGAGGCTATCAATGGACGGTAGAACG

TTTTGGTCGCTATACCAAAACGTTACAGCCGGGGCTCAGTCTGGTGGTGCCGTTTATGGATCGCATTGGTCGCAAGATCAATATGATG
GAGCAAGTGCTCGATATCCCTTCCAGGAAGTTATCTCGAAAGATAACGCCAACGTTACCATCGACGCAGTCTGTTTTATTTCAGGTGA
TTGACGCGCCACGCGCGGCTTATGAAGTCAGCAATCTGGAGCTGGCGATCATCAACCTGACCATGACTAACATCCGTACCGTGTGGG
TTCAATGGAACCTGACGAAATGCTCTCTCAGCGCGACAGCATCAACTCACGCTGCTGCGTATTGTCGATGAGGCCACCAACCCGTGG
GGGATTAAAGTCACCCGTATTGAAATTCGCGACGTGCGCCACCGGCAGAGCTTATCTCTCAATGAACGCGCAGATGAAAGCGGAAC
GTACCAAAACGCGCTTACATTCTTGAAGCGGAAGGGATCCGTGAGCGGAAATCCTCAAAGCCGAAGGTGAAAAACAGTCGCAATCCT
GAAAGCGGAAGGCGAACGTGAGTCGGCGTTTTTACAGGCTGAAGCGGTGAACGTTCCGCTGAGCAGAAGCCCGCGCCACCAAAATG
GTGTCTGAAGCCATCGCCTCCGGTGATATTAGGCGGTGAACACTTCTGAGCGCAGAAATACACCGAAGCGTTACAGCAGATCGGTT
CCTCCAGTAACAGCAAGTAGTGATGATGCCATTAGAGGCCAGCAGCTGATGGGGTCGATTGCCGGGATTGCCGAGCTGGTGAAGA
CAGCGCCAACAAGCGGACTCAGCCATGATGGAGTTAATAGTCGTTTATCCACATATTTCTGGCTCAGTCTCGCGGTTTTGCTGCTGG
CAGCCGAGATGCTGGGCGGAAATGGTTATTTGTTGTGGAGTGGCGTGGCAGCAGTGATTACTGGCCTGGTGGTCTGGCTGGTGCCGCT
GGGTTGGGAGTGGAAGGGGTGATGTTTCCGCTCCTGACGCTGCTGCGCCGCTGGCTGTGGTGGAAATGGTTGTGCGCGCGGGTGCGC
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GATAGAAGGGATAACGCTGATCATCCGTGCGGTTCATCGCCTGATGCGACGCTGACGCGTCTTATCATGCCCGGAAGTCTGCGCCCGAA
TCGTAGGCCCGGATAAGGCGTTTACGCCGATCCGGCAGTCGTGACCGACGCGCTGATGCGACGCGGGCGCGTCAATACAGCCAAAC
CGTAGGCCCGCTCCGCCATGTTAAATGTTAACTGGCATTGGCAATTTACTCTTCCCGGCTTTACTCATACTTTTTTGGTCTTCAATCC
GGATAGTGTTTTTTAGATATCCAGGACGTTTTTATTGACCTTGTTGTGGTATACACCCACCTTTCCAGTAATCAGGCTGGTCCA
GGTAACTTCTGGCGGAATGGTGAAATCAGAAAGCGTTAACCATTCGGCTAACAGATCGGGGTTTCGTTTCTGTATCAATGCAACAG
CATAATCAGCGACATGGCAGAGCAGGAGCCGTACTATCGCCGCTTAAATACTTCCACACTGTGACCGGTTGCAACGAAAAAGGATC
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AAATGAGATTTATCAAGAAACGCATTTTAGCACACATCAGGAACCGCTTACGTTTAGTCCAGAAACAGAAATTTATTTCCGCTTATC
AAAACAGTCTTTACTCTTTTTTACATTGAAAGAGCAGAAATGATTTCTTTTTTATTTATATAAGAAACCAATTTTGTCTTATC
GATGGTGTTTACGCTTACAAACAGACAAAAATGCGCTTTACATCACCAAAATGGCGCGTAGATTTCGATTAAATGCAACGCAGTTTA
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CCATTAATCTGGCATGTGCAATCGGAGATTGAGCAGAAGATTACCGCTTTTTAGAACGCACAGACAACAGCCCGCTGCGTATAC
CTATTTGACTGAACATCACTACATCCCTTCTGAAACACCTGATACCACTCAGACTCCCACTGTCCAGACAGATCTGACGCGAGACAA
AAAACCGTTGCGCTACAGGTGATGTACAGACAACGCGGTTATCAGAGCATGATCAACGCCGACAGTCTGCGGTAATGACGCCC
AGCAACGCAAAATTACAGAGCAACAGGCGCAGATCGTAGCCACACAAAAACGCTCGCCGCGACTGGAGATACGCAAAATACCGCGCA
TTATCAGGAAATGATTAATGCCAGACTGGCGGCTCAAATGAGGCTAATCAGCGCACCGCCACTGAACAAGGGCAGAAAATGAATGCG
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CACATGAACAAATTGACAGCCTGTACAAGACGTAACCCAAACGCACCAACAGTTAACCAACACCCAAAACGGGTTGCAAGATAACAG
CCAGCAAAATTAACAGCTCAATAACCATTTAGTTGCTGCTAAAAACGAAGTTGATGACAATCGTAAAGAAGCCAATCGGGGAACGTGCA
TCTGCCATCGCTATCGCCTACAACACAGGTTAAACCGGTGACGTGATGATGGTGTGAGCGGGAGCGGGAACCTTCAACGGTGAAT
CTGCGGTGTCTGTGCGAATCATTTAATGCGGAACGCATACGGTACTTAAAGCCGGTATTTCTGCGGATACACAACTGATTTCCG
CGCAGGTGTGCGGCTGGGATATTCTGTTCTAATATTTCAATCCTCAATATAAATAAGAGCAAGGAAGCTTGCCGGGTTACCTCTTCAT
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GTTACCCCACTTCCCGCATCGCAGATTGCCAGGCGCAGGGCGTCAGTCATGACACCTGTTACCTCGCAGAACAGCAGCGTCAGGCGGC
TATTTTAAGTGCAATCCGAGGCACAGGCATTTAAAAATGCAAGCCGCAACACGCCCAGGCGGCAAGAAAGCCATTTATAAAGGA
TTTGGCATGACCTTTAGAAATGAGCAGTAAAACTTTGCTTATCTCAATGATTCAATATGTGCAATTGATGAAGACAATAAGATGCCA
CTGTTTATCAGTCAGGCTATATAACGTCATTTGTTTATCATCACACAGGAAAAGTCCGCTTAATGAAAGAAGGCCAGTTTGTGGGTTA
TTTAAAAATGAAGGAGCAAGGAAAAATACCCCTGACGCATATATGATTATCGGTGCGTTATTTTGGCTTCTTGAAGTAGTATTAT
TAGCCTCCCTGGTTACGCTGTGAATGTTAAACAAGAAATCCAGGAAGGCTTATTTAGTCGGGCGCATTTATGGTAGAAAGTTTGCA
GCATATTTCTTCGGTGCAACGGGGATTCACTGATTTTACCCCGCCGATGATGACAGCAGCCGAGAGATTTTCGATAAATCGGCA
GTCGGCGCTGTCAACCGGGCAGGCATTCGCCAGCGCAGTAGCTGTTGCGCATAGATTGCAGTTCTTCGATATGCGGTTCAATC
TCGCCACCTTCTCCAGCTGCGACGTTTGACGTGCGCAGTGTGACGCTGCGGTCGTTAAACAGATTACCCAGTCTGCGGCTCTCTT
CCAGGTTAAAGCCCACTGCGCGCTGGCGCAGTAAGTCAATTGAGATGCTGCTGCGTGTAGGTTGATACCATTTTTCGCT
GCCATCGCGCGGCTACCGACCCCTTCTCTCATAGAAGCAATGGCTTTGCTGGTCAGGCCGTAATTTTGTCTACATCGCTAATG
TTTATCGTTGCGCAACGCC

SEQ ID NO: 24 (EPEC)

ATGAAAACGTGTAACGTTAGCTTTACTGGCACTCATAATTTACGAACATCCAGCCCTTTTGTGTTTGGTGGTATACCATTGAAGCGG
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CAGCCCCGCTGCATATACCTATTTGACTGAACATCACTACATCCCTTCTGAAACACCTGATACCACTCAGACTCCCCCTGTCCAGACA
GATCCTGACGCAGGACAAAAACCGTTGCCGCTACAGGTGATGTACAGACAACCGCCGTTATCAGAGCATGATCAACGCCCGACAGT
CTACGGTAATGATGCCAGCAACGCAATTAACAGAGCAACAGGCGCAGATCGTAGCCACACAAAAACGCTCGCCGCGACTGGAGA

TACGCAAAATACCGCGCATTATCAGGAGATGATTAATGCCAGGCTGGCGGCTCAAATGAGGCTAATCAGCGCACTACCACGGAACAA
GGGCAGAAAATGAATGCACTGACAACCGATGTGGCAGCACAACAGCAAAAAGAGGGCTCAATACGATAAACAAATGCAAAGTCTGG
CGCAGAAGTCTGTCCAGGCACATGAGCAAATTGAAAGTCTGAGACAAGATTCCGCACAAACGAGCAACAGTTAACCAACACCCAAAA
ACGGGTTGCAGATAACAGCCAGCAAATTAACACGCTCAATAACCATTTCAGTTCGCTAAAAACGAAGTTGAGGACAAATCGTAAAGAA
GCCAATGCGGGAAGTGCATCTGCCATCGCTATCGCCTCACAACCACAGGTGAAAACCGGTGACTTGATGATGTTCTCAGCGGGAGCGG
GAACCTTTAACGGTGAATCTGCGGTGTCTGTGGAACATCTTTTAAATGCCGGAACGCATACGGTACTTAAAGCAGGTATTTCTGCGGA
TACACAATCTGATTTCCGGTGGGGTGTGCGGCTGGGATATTCTGTTCTAA

SEQ ID NO: 25 (EAEC)

ATGAAAACCTGTAAAGCTGTCTTTACTGGCTGTGCTTGTGCTACCGCGGTAAGTCCATCTGCGTTTGGCGGTGATACTGTTGAGGCGG
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TAGTGTAGCCGCACAAAATTATCTGATTGCGCATGATTACCAGACAACGACGCTCAGGAAAATACAGCTGCTTCTCCGTACAGCCC
ACCAATACGCTGAACCCGATAACCAATCAAGCGCAGACCGACCGGACAACGGGCAGGATACCGCCATTGAGGACGCGCAGCAGCCG
CCAACCTGGGCTTCACTGAAAGCTGATGACGCGCAGCAGCCATCACGGTGGCGCAGACGGATATTGATGCCAATACAGCCGCCATCAC
CGATACCCGTATGATGTCTCCGCGTGCAGTCAGACGTCAACACATAAAAGGCGATGTGCGCATGCCCAGTCAACGGCTGACCAT
GCCAACGCTAACGCCAACACCGCTCTGATTAACGGCGTCAAACCTTCCGGTGTGTGACAGAAAACAAAAACAACATCGAACAGAACC
GCAGCGATATTGCTGACCAGCAGAACTGTTGGCATCAACGAGCAAAAACAGATCGTCCGCGACAACGGGCAGGATACCGCCATTCA
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AATAAGCCGCCATCACCGACATCCGTAATGATGTCTCCGCGTGCAGTCAGACGTCAACACATAAAAGGCGATGTGCGCATGCCC
AGTCAACGGCTGACCATGCCAACGCTAACGCCAACACCGCTCTGATGAACGGCGTCAAACCTCTCTCTGTGACAGAAAACAAAA
TAATATCGAACAGAACCGCAGCGATATTGCTGACCAGCAGAACTGTTGGCATCAACGAGCAAAAACAGATCGTCCGCGACAACGGG
CAGGATACCGCCATTGAGGACGCACAACATGCCGCCAATGGGCTTCAATGAAAGCTGATGACGCGCAGCAGCCATCACGGTGGCGC
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AGCTGACACCCAGCAGCAACAAATGGACGATCAGCAGAAACAAATCGACGCGACGCAAAAACGGTTTCCGCACTTGGCGATGCCAG
ACCAACGCACATTATCAAGAGATGGTTAACGCCGGGACTGAGAGCACAATAATGATGCGAATGCGCGTACTGCAGCAGAACAAAAACAA
AAATAGATACTCTGGCGACTAACAGGCAACGCAACAGCATATCAATAGTGTGCGTACGGGGAACAAATTGAGCGTCTGGCGCAAGA
CTCAACACAAACGCATGAACAAATTGACAGCCTGACACAAGACGTAACCCAAACGCATCAGCAGTTAAGCAACACGCAAAAACGAGTA
GCGGATAATAGCCAGCAGATTACTACGCTCAATAACCATTTCAGTTCGCTGAAAAACGAAGTTGAGGACAACCGTAAAGAAGCCAATG
CGGGAATGCATCAGCCATCGCTATCGCCTCACAACCACAGGTGAAAGCCGGTGACTTTATGATGATGTCAGCGGGAGCGGGAACCTT
CAACGGTGAATCTGCGGTGTCTGTGGAACATCTTTTAAATGCCGGAACGCATACCGTGATTAAAGCCGGTGTCTCTGCGGATACGCCAA
TCTGATTTCCGGCGGGTGTGCGCGTGGGATATTCTTTCTAA

SEQ ID NO: 26 (UPEC)

ATGAACAAAATATTTAAAGTTATCTGGAATCCGGCAACAGGCAGTTACACCGTTGCCAGCGAAACGGCGAAGAGCCGTGGTAAAAAA
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GCCAATGATTATGGCGATGGCTCAGCAGGTGACGGCTGGGTTGCTATCGGTAAAGGGGCAAAAGCAAATACCTTTATGAACACTAGT
GGCGCGAGTACAGCTTTAGGATATGACCGGATAGCCGAAGGTGAGTACAGTTCTGCCATCGGGTCAAAAACCCCTTGCAACTGGTGGAG
CATCCATGGCGTTCCGGGTTAGTGCAAAAGCAATGGGTGACAGAAGTGTGCGCTAGGTGCATCGTCAGTAGCAATGGCGATCGTTC
GATGGCTTTTGGTGGTTACGCAAGAGCAATGGTTTTACATCTCTTGTCTATTGGGGACTCCTCCCTTGCCGATGGTGAAAAACTATT
GCGTTAGGAAATACGGCTAAAGCTTACGAAATATGAGCATCGCCCTCGGTGATAATGCCAATGCGTCAAAGAGTATGCAATGGCGC
TGGGAGCAAGTAGCAAGCTGGCGGTGCTGATAGCCTCGCATTCGGCAGAAAATCTACAGCTAATAGCACTGGCTCACTGGCAATAGG
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GCATTGCAAGCAAAAGTGAACCTCAATCGCGTTGGGAAGTAACAGTTTGTCTCGGGAGAGAATGCCATCGCATTGGGAGAGGGTAGTGC
CGCTGGTGGCAGCAACAGCCTTGCTTTCCGTAGCCAGTCCAGGGCAACCGCAATGATTCTGTGCGCATCGGTGTAGGGGCTGCAGCA
GCGAGGACAATTTCTGCTATCGCGCAGGATCGACCACAGATGCAAGCAATACGGTTTCAGTTGGCAACAGCGCAACAAAACGCA
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TCGCCACTAACACCAATATACCAACCTGACTGACGCTGTTAACGGTCTCGGTGACGACTCCCTGCTGTGGAACAAAGCAGCTGG
CGCATTACGCGCCGCGCACGGCACCGAAGCCACAGCAAAATCAACACGTACCGCTGGCAACCTGACTGCCGTTAGCACTGACGCC

GTAAACGGCTCCCAGCTCAAACACCAACGACAACGTGACGACCAACACCACCAACATCGCCACTAACACCACCAATATACCAACC
TGACTGACGCTGTTAACGGTCTCGGTGACGACTCCCTGCTGTGGAACAAAACAGCTGGCGCATTACAGCGCCGCGACGGCACTGACGC
CACCAGCAAGATACCAACGTACCGCTGGCAACCTGACTGCCGCGAGCACTGACGCCGTTAACGGCTCCCAGCTCAAACACCAAC
GACAACGTGACGACCAACACCACCAACATCGCCACTAACACCACCAATATACCAACCTGACTGACGCTGTTAACGGTCTCGGTGACG
ACTCCCTGCTGTGGAACAAAACAGCTGGCGCATTACAGCGCCGCGACGGCACTGACGCCACCAGCAAGATACCAATGTCAAAGCCGG
TGACCTGACGCTGGCAGCACTGACGCCGTTAACGGTCTCAGCTCAAACACCAACGATAACGTGTGACCAACACCACCAACATC
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SEQ ID NO: 28 (EAE)

ATGAACAAAATTTTAAAGTTATCTGGAATCCGGCAACAGGCACTTACACCGTTGCCAGTGAAACGGCAAAAAGCCGTGGCAAGAAAT
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SEQ ID NO: 29 (*Burkholderia fungorum*)

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SEQ ID NO: 30 (EPEC)

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SEQ ID NO: 31 (Shigella)

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SEQ ID NO: 32 (*Brucella melitensis*)

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SEQ ID NO: 33 (*Brucella suis*)

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SEQ ID NO: 34 (*Ralstonia solanacearum*)

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TCAAGAACACGATGAACACCATCTGAACGGCGGCGGGCTCAAGTACTTCCACGCGAAGCTCGACGCTGGACGATGCGCAGGCGATGGG
CCTCGAGTCGATCGCGTTCCGGCGGCGCAGCGCTCGCGGCCGATGAACTCGATGGCGATGGGCGGCAATGCCCGGGCGGTGGCGGGC
AACGCTGTGGCCTTGGGCGCGGGTTCGGTGGCGGACCGCGCAACAGGCTGTGGTGGGCTCGCGGGCAAGGACGCGCCAGATCACCA
ACGTGGCGGCGGTACGGCGGACACGGATGCGGTGAACGTTGCCAGCTGAAGGCGGCGCGCATCATACAGGCGAGCGGACGAGCA
CGCCACGGTGACGTACGGCACCAACGACAGCGGCTCGGCGGACTACGGCAACGTGACGCTGGGCGGCGGCAACGCGCGGCGCGGACG
GCGATCCACAACGTGCGGCGCGGACGCGCGGAGACCGAGCGGTGAACGTACGGCAGATGAACGCGGCCATTGCCAGCGTGCAGAAAG
TGAGCAACCAACGACCCGATGTTCCGGCGGATGGCGACCGCGCTGTCAAGCGCGGAGCGGCAAGGGCAGCGATGCCACGGCGAT
GGGTGCCGCGGCGACGCGGGCGGCGACCGTCCGTCGCGACGGGCGCAACGCGCAGTCCGGCGGCGACAGCTCGGTCCGATGGGC
GCGAATGCGAAGGCGACGCGCAATCATGCGGTTGCCGTGGGCTCGGTTCCGTAGCGAACCAGCGCAACACGATGTGGTGGGCTCGG
CGGCGAGCGAGCGCAGATCACCAATGTTCCGGCGGCTGTGCGGGTACCGATGCGGTCAACGTGAGCCAGCTGAGCCAGGCGGTCTA
TGCGGCCGTCCGCGATCTGCCGCGGGCAGCAGCGCCAGGCGTACACGATGAGCAGATCGGCATGGTCCGGCAGGGGATCAGCCAG
GTGGCGCGCGCGCTTACAGCGGTATCGCGCGGCGACCGCGCTGACGATGATTCCGGACGTCGATCAGGGCAAGTCGATCGCGATCG
GTATCGGCGCGCGACCTACAAGGCTATCAGGCGGTTGCGCTGGGCGCCTCGGCACGCGATCTCGCACACCTGAAGGCCAAGATGGG
CGTGGGCTACAGCAGCGAAGGCACGACGGTCGGCATGGGCGGCTCGTATCAGTGGTAA

SEQ ID NO: 35 (*Sinorhizobium meliloti*)

GTGGCGCTGGGACGCCAATCGGTTCTCGGCCGCGCAGCGGTTCACTTGCATTCCGTAACGGTAGTTACGCGAATTCAAACGGATCGGTTG
CCATCGGGCAGTCTGCATACGCGGCCAATGTTCCGGCAATCGCAATCGGTGGAGATGATGCCTTCGCTTGGCGAGAGGCCGAGCAGAC
CAAGGCCGGGGGCTCCAGTCGATCGCCATGGGCGTGCGGTACGAAATCGCTGGTAGTCGACGACCCGGATACGGTGGCCAAAC
GAAGCGGACCCGGGCGGCGGTCTGATGCCATTGCAATCGGTACGGATGCACAGGCCAATGGCGACCGGTCTCTCGCCATCGGCAGAC
AGAATCAGGCCGGCAATGAGCAATCCATCGGCATCGGCGCGGGCAACACGGCAACAGGCCAACTCTCGATCGGCATCGGCAGCAGCAA
CGTGGCCAGCGGCGAGCAATCCCTAAGCCTCGGCGCGGGCAACAATGCCCTGGGGCAGGGCTCCATCAGCATCGGTACCGAAACACA
GCCGGCGGTCTCCGGTCGATCGCTTTCGGCGTGCGCGCGAGTACGAAAGAAGCCAATCTAGATATTCCGGATGACGTGGCCGCGATCG
ACGCCATCGCTATCGGTACCAATACCAAGGCCAACGGCGACCGGTCCGTACGATCGGAACGGGCGAGTCAAGCCAGCAGCGGAGCCGT
CAGTATTGGCGATGCAGCAAGGCTGTGGGTGACAAATCCGTACGTATCGGTACCGAAAGCTGGGCCGATGGCGACGAATCGGTACG
ATCGGCCCTGTCAACAACCGCGGTTTGAAGGGAATGACCGAATCAAAGCGGGCAACCTCTGTACGCTGGGAGCCTTCAATCAGT
GCCGCGCATCGAGGCCATTGCTATCGGTGCCAGAAACGAAGCCATCCGGATCGGTGATTGCAATCGGTCGCGGAGGAAACGAA
GGCGCGCATCCGCGCGGACGCGGCGGCGGCGGCGGTCGCTATAGGCACGCGATGCGCTGGCCAACGACGACCGGCTCCATC
AGCATAGGCTGGAATAGCATACCTCCCTGAACGATTCCATCAGCATCGGTACCGAGCCACGTCCGGATCGGCGGGCGATATCATGA
TCGGCACAGGTTACAGGACTGGTTCCACCTCCGGTCAGAACATGTGCCCTCGGCGTTGGCGGCGAGTCAAGAGTGAAGGGGTGCTC
AAACATAGCGATCGGCGATTCCGGCGGGCGGTTCCCGGAAGGCGATAACAACGTGCCATAGGACCAATGCGGGAATCCAGTTTCC
GAGAGCGAACATGAGACCGCGCTGCGCGCGGACCTCGTGGTACGTGACGCGGTGAGCATCGGCAATGAGGCGCTGGCGAGCGCGGATG
AAGCCATCGCAATCGGCACCGGCGCGGTTCCGGTTTGAAGTCCATCAGCATCGGCGTGGGAAATACCGTCAGCGGCGCTTCGAG
CGGCGCATCGGCGATCGGACGATATACCGGTACCGGCTCTACTCGTGGGCAACGACAACACCATCGCGCGGACAAACCGCGG
ACCTTCGGCAACGACAACACATTGGCGGATGCCCGGATGGCAGCGCGTCATCGGCAACGGCAACAATATCGATGTGTCGATGCCT
TCGTGCTCGGCAATGGTGGCGACGTACCGAAGTCGGCGCGGTGGCGTGGGTTCCGGCTCGGTTTCGGATACGGGTGCCGACGTGGC
GGGCTATGTGCCGGCGGGGCGCTCGACGGCGACCAAAACGCCATCGAGGCGACGACGACGCGCGGCGGTCGCGTCCGCAAT
CCGACGCGCAACCGGCGTCTACCGCCAGATCACAGGTGTGCGCGCGGCGACGGCGGACTCCGATGCCGCAACGTGGCCAGCTCA
AATCGGTGAGACGATCGCAAGACAGGCTGGAAGCTCAGCAGCGACGCGGCGAGCATCGACGGCATCGGCGCGGCGACGAGTTGGT
CCTCAAAGCGGCGACGGCAATATCGTGATCAGCAATCAGATCTTGAGCAACGACGTGAGCATCGATCTGGCCGATGAGATCGAGGTG
AACAGGGTGACGGCGAGAGATCCCGACACGGGTGATCCACGGTGTGGACGAGAAGCGCTGAGCTTCACGACGAGGACGCGAAGC
GGGAGGACACGGCGCTCGGCGCGCGGTCAGCGCGGCGGGCATCAAGCGGCGGCAAAATACCAATGTGCTGCGGGCGAGGCGGA
CACCGACGCGGTGAATTTTCCAGCTCAGGCAAGTCGAGACCGCATCGGGCAATACCGACGCGGGCGGTCAAATATGACTGGACC
GACGCCAATACGAATGGCGTGATCGATGAGGGGCAACTCAACCTCGATAGCGTGACCTTGGCGGGGCGATGGGCGGACCGAGGATCT
CCAATCTTGGCGCGGCGCTTGAAGCGGCGATCGACCGATGCCGTCAACGGCAGCGAGCTCTTCCGGCTTCGACGCGCGGTATCCAA
CGTGGCGTCCGCTGGGCGGGGAGCCGCTATGACCTGTCAAGGATGAGTGGATCGCCCCGAAATACAGGATCGGCGGACCGGAC

TACAGCAATGTGCGGCGACGCGCTGGCGGCGGTGGGCGGCACGGCCGGTGCCGGCTGGAGCCTCTCGGCGCAGGGTGCGAACGCGTCCA
 ATGTGCGCGCCGGGCGAGACGGTGGATCTTCGACGCGGCGACGGCAATATCGTCGTAGCAAGGCGGAGACCGGCGACACCGTGAGCTT
 CGACCTGGCCGACGATCTGGACGTCTCCGAAAGCATCACGGTGGGTGCCGATCCCGCCGATCCGAATGCGCCGACCACTGTTATCACC
 GCGGTTTCGATCGTGATCGGCAGCACCATGCTCGGCAGCAACGGCTGGTCATCACCGGGGGCCGAGCGTCACGACCGATGGCATCG
 ATGCCGCGGCATGAAGGTACGAATGTGGCAACGGTACGGTGGCGAAGGATTGGAAGGATGCCGTCAACGGCGGCCAGCTCTTCGA
 CGTCGTTGCGAATGCCACTGCGAATGGCGTCGGCTATGACGACAAAAGCAAGGGCACCTGACGCTGGAGGGGGCTAACGGCACCAAG
 ATCACCATGTGCGCGCGGGCGACCTGAACGCGAAGTACGACCGCGGTCAACGGCAGCCAGCTTTACGCCACGAACGTGAAGGTG
 ATCGGCTCGATACCGAAGTGAAGAGATCGACAGCCGCTAACCTATATCGAGAGCTTCCAGGGCGATCTGGAGAAGCTGCCGTCTA
 TGATACCGACGCTGCCGCAAGAGGCTCAACACGCTGACGCTCGAGGGAGGAGATCCCGACAAGCCGGTGCTCATCGCCAATGTGGCC
 AAGGGCGTGAAGGCGACCGACGCGCTCAATGTGCGCCAGCTCGACGAAAGCGTCGCGAAAGCAAGAGCTACACGGACGAAAAGACCG
 AGTGGGCGATCGATCAGCGCGCATCTACACCGACAGGTTATCGAGACCAAGGTGAGCGCGTGAACAATTATGCGCAACAACGGTT
 CGCGCAGCTCTCGGGCGAGATCGGGCAGGTTTCGAGCGAAGCGCGCAAGCGCCGCGCATCGGACTTGGCGGCGCTCGCTGCGCTTC
 GACAATGAGCCGGGCAAGCTGAGCGTGGCGCTCGCGCGCGCTTCTGGAGAGCGAAGGGGCGCTCGCTTCCGTGCGGCTACACCA
 GCGAAGACGGACGCGTCCGGGCGAACCTGACCGGTGCTGCGGCGGGGGGAACGTCGTTGTCGGTGCCGGCCTCAGCATCAGCTCAA
 CTGA

SEQ ID NO: 36 (*Bradorhizobium japonicum*)

GTGCGGGCCTTCGGCTCCGGCAACGCCATCAACGGCACCAACTACGCGGCCGTGGCTCCAACAACGTCGTCGCGGCAACAACGGCG
 CGGTTGTGCGGCTCCGGCAACGGCGTCACCGCGACAACACCGCGGCTTCGGCTCCAGTATCGGCATCGCGCGGCGCAACAACGGCGC
 TGTGCGCTCCTTCAGCACCCTACCGGCAGCAACAGCGCGCTGTTGGCTCCTTCAACAACGTCAGCGCAATAACAGCGCGCCTTT
 GGCACCGGACAGAATCCGCGGTAAACGGCACGTTGCCATCGCGCATCCCAACATCGTCAACGGCAACAACAGTTTGGTGTTCGGCG
 ACAACAACAGGTGAACGGGTCCAATGTGGCGGTCGCGGCGACAACATCCAGCTGGTTCGCTCGAACAACACCATTGCGGCAACGTC
 CAGCGCGCGCGGCTCATCGGTGTTGCGCAGCGGCAACACCGTCAACGCCACCAATGCCGTGGTATGGGCAACAACAGCACCCTCTCC
 GCGCGCTCCTCTGTCGCGATCGGCAATGGCACGGCGTTACCGGCATCAACGCGATCGCGATGGGCACCGCGCGCGCGCAATTCG
 ACAACTCGGTTCGCGATCGGCAGCGCGCGACACGACGCGCGCAACCAGGTGCGAGTCGGCACCGCGCGCGCAATCTGGCGACACC
 CGGCATCACCTCGGCTGCGAGCAAGGCGGCGCAGTCCGAGCGACCGAGCTCGTCACATCGGACCGCGCGCGCAATCTGGCGACACC
 TCGCTGGCTGGCTCGGACTTGCTCCGCGCGCGACATCAACGGAATCAACTCCCAACTGGCCGCCCTCAACGGCGCGCTCGACAACC
 TGACACGGGAGTCGCGCGCGCGGCTGGCGTTGGCGCTCGCGGCGTCCAGCTGCAATTCGATCCTCGCCCCGCGAAGATCTCGGTCTC
 CGGCGGCTTCGGAATTTCCAGGGACAATCCGGCTCGCGGTCGGCTCGGCTATTCTATTTCGAGCGCATGCGCTTCAACGGCGCG
 TTCACGGCGCGACAGCAAGGCGCCATCGGCGTACGGCGCGCGCGTCTGGAGCGTGAAGTGA

SEQ ID NO: 37 (*NadA*)

MSMKHFPKVLTTAILATFCSGALAATSDDVKKAAATVAIVAAYNNGQINGFKAGETIYDIGEDGTITQKDATAADVEADDFKGLGL
 KKVVTNLTKTVNENKQNVDAKVKAAESEIEKLTTKLADTDAALDTDAALDETTNALNKLGENITTFEETKTNIKIDKLEAVADT
 VDKHAEAFNDIADSLDETNTKADEAVKTANEAKQTAEETKQNVDAKVKAAETAAGKAEAAAGTANTAADKAEVAAKVTDIKADIATN
 KADIAKNSARIDSLDNVANLRKETRQGLAEQAALSGLFQPYNVGRFNVTAAGVGYKSESAVAIGTGFRFTENFAAKAGVAVGTSSGS
 SAAYHVGVNVEW

SEQ ID NO: 38 (*YadA*)

MTKDFKISVSAALISALFSSPYAFADDYDGI PNLTAVQISPNDPALGLEYPVRPPVPAGGLNASAKGIHISIAIGATAEAAKGAAVA
 VGAGSIATGVNSVAIGPLSKALGDSAVTYGAASTAQKDGVAGARASTSDTGVAVGFSKADAKNSVAIGHSSHVAANHGYISIAIGDR
 SKTDRENSVSIHESLNRQLTHLAAGTKD DAVNVQ LKKEIEKTQENTNKRSAELLANANAYADNKSSSVLGIANNYTDKSAETLE
 NARKEAFAQSKDVLNMAKAHNSVARTTLETAEEHANSVARTTLETAEEHANKKSAEALASANYADSKSSHTLKTANSYTDVTVSNS
 TKKAIRESNQYTDHKFRQLDNRLDKLDTRVDKGLASSAALNSLFQPYGVGKVNFTAGVGGYRSSQALAI GSGYRVNENVALKAGVAYA
 GSSDVMYNASFNIW

SEQ ID NO: 39 (Consensus)

MXMXKXKXLLAXAIXAXFSXGALAAXTXDXXTGPEAXVXIXPXAXXXLXXXXXXXXXXXXGLXAXAXXXSSXADAEAXVFK
 GLXXXXXPNIXTXXXXXQTKDQIAMLIRXXXNLXENKXVXXXVAAIKXIPKDLIAKXADVXXXXXVXXAXRXTXAXNNLKS GHS
 SHVAANHGYISIAIGDRSKTDRENSVSIHESLNRXLXXXAXKXKEEXXENIAQIDXNXEQXXEXDXKXEXXNXXXXLAXXXXXAXX
 XAXXVNLXXXXXXXXXXXXTXXNLXQKIAEXKXNDAXKXAXXXXXXXXXXXXXXXXXXNTKDIXLXTXXDXXNSAXXAA
 XTXXIATEXSXXFEXXXXXXQXXQXIANNXTXVAIXEQXIXXNTARIDXLNDRNVNXLDEKXKAGLASQAALSGLFQPYNVGKLNVA
 AVGGYXSSXAXAIGXGSRFNFENXAAKAGVAXDTQXGSSAGYXVGVNFEW

5 SEQ ID NO: 40 (primer)

TATCGGCAACGACGCAAGC

SEQ ID NO: 41 (primer)

GGCGATTAGCCATTGATAC

SEQ ID NO: 42 (primer)

AACGGTTGATGCCGCACTAG

SEQ ID NO: 43 (primer)

GTGTTGATAGGTGGCACTACTG

SEQ ID NO: 44 (primer)

GCAGAGAAAGCAAAAGGTGATTC

SEQ ID NO: 45 (primer)

CAAAATTCTGCAGACATCGCAAC

5 SEQ ID NO: 46 (primer)

CAAACCTGCAGTTGCTGTAGG

SEQ ID NO: 47 (primer)

ACCTACAGCAACTGCAGTTTG

SEQ ID NO: 48 (primer)

CAACTCCCTCTTCTAAAGCTG

SEQ ID NO: 49 (primer)

AGTAGTGCCACCTATCAACAC

SEQ ID NO: 50 (HadA)

CGACGCAAGCCAAGTAATAGTAATATTTAATTAGGTATGATGTAAATCTGCTTGAGGCCAAATTTTACATAGGAAATTTTCTATATT
 GCTTTAACGTTTTTTTATAGTAGAAGTATATACTCAGTTATGGTTATGGTTACATAGTATAGTTTTACTTTGTCTAGTTCACTTTAA
 TAACCTTAAATAATTGAGGATTTCTTATGAAAAGAAATTTATTAAACAATCTGTAATCGCTGTGTTGATAGGTGGCACTACTGTTTC
 TAATTATGCTTTAGCACAAGCACAAGCACAAGTCAAAAAAGATGAACCTAGTGAGTTAAAGAAACAAGTAAAGGAAATGGAT
 GCTGCTATCGATGGTATCTTGATGATAATATTGCTTATGAAGCTGAAGTTGATGCAAACTTGATCAGCATTCTGCTGCTCTTGTA
 GACATACAAATAGACTCAATAATCTTAAACGATTCAGAGAAAGCAAAAGGTGATTCAAGTGAAGCACTTGATAAAATTGAAGCTCT
 TGAAGAACAAATGATGAGTTTTTAGCGGATATTACAGCTTTAGAAGAGGGAGTTGATGGTTAGATGATGATATCACAGGTATTCAA
 GATAATATTTCTGATATAGAAGATGATATTAATCAAAATCTGCAGACATTGCAACTAACACAGCGGCAATCGCAACTCACACTCAAC
 GTCTTGATAATTTAGATAACAGAGTAAATAACCTTAATAAAGATCTTAAACGTGGTCTTGCTGCTCAAGCTGCATTAAATGGTTTATT
 CCAACCGTATAACGTAGGTAAATTAATCTTACTGCTGCTGTAGGTGGTTATAATCTCAAACCTGCAGTTGCTGTAGGTACTGGTTAT
 CGTTATAACGAAAATATCGCGGTAAAGCAGGTGTTGCTTTCACTCATGGTGGCAGCGCAACTTATAATGTTGGCGTAAATTTTGAAT
 GGTAAATAGATAACTAATTTTCCATAACAGAAATAAATACCTGTTTTTGGAGTAATATCAGAAACAGGTATTTTTTTATAGGCTTCGT
 TTCGCACACTCGTTACTAGTGTGGATATGTGAATAAATCAATAATATTTGGAGTATTTTATCTATTTTATTAATTTTGTAGCGGAT
 AAAATAACTTTCTGTGTGTTCTCCAAATCTTTAAATCAATAAACCTTAATCGTTCATAAAACGAGCTGGCATCATCATTTTTTGC
 TTCAACGACTAAAATTGTAGCAGCTACCGTAGCATTCTTAATCTTATGAATGGCGTCTGCAATTAGAACTTTCCATACCTTGCTTC
 TGGAAATTCGTATCAATGG

10 SEQ ID NO: 51 (HadA)

MKRNLKQSVIAVLIGTTVSNYALAQQAQAQVKKDELSELKKQVKEMDAIDGILDDNIYEAIEVDAKLDQHSALGRHTNRLNNL
 KTIAEKAKGDSSEALDKIEALEEQNDEFADITALEEGVDGLDDDIITGIQDNISDIEDDINQNSADIATNTAAIATHTQRLDNLNDRV
 NNLNKDLKRLAAQAALNGLFQPNVGVKLNLTAAVGGYKSQTAVAVGTGYRYNENIAAKAGVAFTHGGSATYNVGVNFEW

SEQ ID NO: 52 (HadA C-terminus)

TGYYRYNENIAAKAGVAFTHGGSATYNVGVNFEW

SEQ ID NO: 53 (Gene downstream of HadA)

ATGATAAATGAAAATTTAGCATATTTAAGTGATTACCTTAGAAGATGTAAAGATTGAGAGAAGTTCATTTTCTTGTTCAAGTTGAAC
 CTTTAGAAAACCTACTTTTCAAGTACGTTTCTCAAGATGTAAAGAAAGGGCTTGCAAAGTGTGTTGTGCTTATAAATGCACAACCATC
 TAGGATTGTTGGCTATTACACTTTATCGGCATTATCAATACCAATTCAGATATACCCCAAGAACGAATAAGTAAAGGCGTACCATAT
 CCTAATATTCCTGCTGTTTTAATAGGGCGATTAGCCATTGATACGAATTTCCAGAAGCAAGGGTATGGAAAGTTCTAATTGCAGACG
 CCATTTCATAAGATTAAGAATGCTACGGTAGCTGCTACAATTTTAGTCGTTGAAGCAAAAAATGATGATGCCAGCTCGTTTATGAACG
 ATTAGGGTTTATTGAATTTAAAGAATTTGGAGGAACACAGAAAGTTATTTATCCGCTAACAAAATTAATAAAATAG

SEQ ID NO: 54 (Sequence encoded by SEQ ID NO: 53)

MINENLAYLSVLPLEDVKIERSFSCSVEPLENYFHKYVSQDVKKGLAKCFVLINAQPSRIVGYTSLALSIPIDIPQERISKGPVY
 PNIPAVLIGRLAIDTNFQKQYGFILADIHKIKNATVAATILVVEAKNDASSFYERLGFIEFKEFGGTHRKLFPYPLTKLIK

SEQ ID NO: 55 (Histone acetyltransferase)

MINENLAYLSVLPLEDVKIERSFSFSCSVEPLENYFHKYVSQDVKKGLAKCFVLINAQPSRIVGYTSLALSIPIDIPQERISKGV
 PNIPAVLIGRLAIDTNFQKQGYGKFLIADAIHKIKNATVAATILVVEAKNDDASSFYERLGFIEFKEFGGTHRKLFYPLT

SEQ ID NO: 56

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGCAATGTGGGTTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAAGCGTAATTTAAGTTAATATCTTGTGGTACATTTAAGAATACAAAATGCCCATCACCTAGTG

SEQ ID NO: 57

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGCAATGTGGGTTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAAGCGTAATTTAAGTTAATATCTTGTGGTACATTTAAGAATACAAAATGCCCATCACCTAGTG

SEQ ID NO: 58

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGCAATGTGGGTTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAAGCGTAATTTAAGTTAATATCTTGTGGTACATTTAAGAATACAAAATGCCCATCGCCTAGTG

5 SEQ ID NO: 59

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGCAATGCGGGTTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAAGCGTAATTTAAGTTAATATCTTGTGGTACATTTAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 60

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGCAATGCGGGTTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAAGCGTAATTTAAGTTAATATCTTGTGGTACATTTAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 61

GCAAGCCAAGTAACAGTAATGTTTAATTAGGTATGATTTAAATTCGTTTATATCACACTAGAAATGAGGATTTCTTGATTGGTAT
 TAACTAAATTACGCATTAATAAGGCGTAATTTAAGTTAATATCTTGTGGCACATTTAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 62

TTAGGTATGATTTAAATTCG

SEQ ID NO: 63

ATAGTATAGTTTACTTTGTTCTAGTTCACTTAATAACCTTAAATAATTGAGGATTTCTTATGAAAAGAAATTTAT

10 SEQ ID NO: 64

CCGACGCAAGCCAAGTAATAGTAATATTAAATTAGGTATGATGTAATTCGCTTGAGGCAAATTTACATAGGAAATTTTCTATAT
 TGCTTTAACGTTTTTTATAGTAGAAGTATATACTCAGTTATGGTTATGGTTACATAGTATAGTTTTACTTTGTTCTAGTTCACTTTA
 ATAACCTTAAATAATTGAGGATTTCTTATGAAAAGAAATTTATTAACAATCTGTAATCGCTGTGTTGATAGGTGGCACTACTGTTT
 CTAATTATGCTTTAGCACAAGCACAAGCACAAGCAC

SEQ ID NO: 65

AGGATACGAAAAATATCGGCAAACGACGCAAGCCAAGTAACAGTAATGTTTAGGCTTGATAGTATAGCTTTGCTTTGTTCTAGTTCA
 ATTTAATAATCTTAATAATTAAGGATTTCTTATGAAAAAATTTATAGGCTTCGTTTCGCACACTCGTTGCTAGTATAGATATGTG
 AATA